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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,795	03/26/2004	Chien-Hao Chen	67,200-1227	9768
47390	7590	05/16/2005	EXAMINER	
THOMAS, KAYDEN, HOSTEMEYER & RISLEY LLP			CHEN, JACK S J	
100 GALLERIA PARKWAY			ART UNIT	
SUITE 1750			PAPER NUMBER	
ATLANTA, GA 30339			2813	

DATE MAILED: 05/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/810,795

Applicant(s)

CHEN ET AL.

Examiner

Jack Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 and 40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 and 40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

In response to the communication filed on March 2, 2005, claims 1-25 and 40 are active in this application.

Applicant's election without traverse of Group I, species combination of A-1, B-1, C-2, D-2, E-1 and F-1 in the reply filed on March 2, 2005 is acknowledged.

Claims 26-39 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Election was made **without** traverse in the reply filed on March 2, 2005.

Oath/Declaration

Oath/Declaration filed on March 26, 2004 has been considered.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 2 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claims 2 and 15, the limitation "forming a buffer oxide layer over the compressive stress dielectric layer and tensile stress dielectric layer" is not supported by the specification. As best can be understood by the examiner, it appears that the buffer oxide layer 32 is formed over the compressive stress dielectric layer 30A OR tensile stress dielectric layer 30A, but not both.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 5-6, 10-12, 14, 18-19, 23-24 and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Saitoh, U.S. Pub. Number: 2003/0040158 A1.

Re claim 1 and 14, Saitoh discloses a method for forming semiconductor device, which comprises providing a semiconductor substrate 1 comprising gate structures 13/6 and offset spacers 7a/7b overlying respective PMOS and NMOS device regions (fig. 3A); forming source/drain regions 10s/11s (fig. 3a); forming silicides 12a/12b/12d/12e over the source/drain regions and over 12c/12f an upper portion of the respective gate structure (fig. 3A); forming a first dielectric layer 14 comprising a stress type selected from the group consisting of tensile stress and compressive stress (i.e., tensile stress) over the respective PMOS and NMOS device

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regions (fig. 3A); removing a portion of the first dielectric layer overlying one of the PMOS and NMOS device regions (fig. 3B); forming a second dielectric layer 16 comprising a stress type opposite (i.e., compressive stress) from the first dielectric layer stress type over the respective PMOS and NMOS device regions (fig. 3C); and removing the second dielectric layer overlying one of the PMOS and NMOS device regions to form a compressive stress dielectric layer 16 over the PMOS device region and a tensile stress dielectric layer 14 over the NMOS device region (fig. 2), see figs. 1A-5 and pages 1-8 for more details.

Re claim 40, Saitoh discloses a method for forming semiconductor device, which comprises providing a semiconductor substrate 1 comprising a first gate structure 13 overlying a PMOS device region and a second gate structure 6 overlying a NMOS device region (fig. 2); forming a first layer 14 with first stress over the NMOS region; and forming a second layer 16 with second stress over the PMOS region such that an interface 20 is formed between the first layer and the second layer (fig. 2); wherein the second stress is different from the first stress, see figs. 1A-5 and pages 1-8 for more details.

Re claims 5 and 18, wherein the first and second dielectric layers comprises a material selected from the group consisting of silicon nitride and silicon oxynitride (i.e. silicon nitride), see paragraph 102-103.

Re claims 6 and 19, wherein the first and second dielectric layers are formed by a CVD deposition process selected from the group consisting of LPCVD, ALCVD, and PECVD, see paragraph 102-103.

Re claim 10, wherein the silicide comprises a metal silicide, see paragraph 100.

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Re claims 11 and 23, wherein the metal silicide is selected from the group consisting of cobalt silicide and titanium silicide, see paragraph 100.

Re claims 12 and 24, wherein the first and second dielectrics layers are formed without a subsequent ion implantation process to relieve a stress level (in this case, no subsequent ion implantation process to relieve a stress level).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 2-4, 7-9, 13, 15-17, 20-22 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh, U.S. Pub. Number: 2003/0040158 A1 in view of Huang et al., U.S. Pub. Number: 2004/0104405 A1.

Saitoh disclose above; however, Saitoh is silent to further forming a buffer oxide layer over the compressive stress dielectric layer or tensile stress dielectric layer (due to 112 problem, as best can be understood by the examiner).

Huang et al. teach a method for forming the similar device, which comprises further forming a buffer oxide layer 42 (fig. 1 and paragraph 27, wherein the buffer oxide is silicon oxide having thickness of about 200-700 angstroms) over the compressive stress dielectric layer 40 or tensile stress dielectric layer 40 (fig. 1). Huang et al. further teaches using silane (SiH_4) as the source gas (see paragraph 46 and 51) for forming compressive stress dielectric layer or tensile stress dielectric layer, see figs. 1-5 and pages 1-5 for more details. Further in this regard, applicant admitted that this particular process is well known in the art (see application's specification, page 10, paragraph 21).

Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to further forming the buffer oxide as taught by Huang et al. in the method of Saitoh in order to provide protection for the tensile stress dielectric layer during the step of removing the compressive stress dielectric from the NMOS area.

With respect with claims 13 and 25, although the exact recitations "first and second dielectric layers form a contact etching stop layer" of the instant claims 13 and 25 are not explicitly stated by Saitoh, it appears that layers 14 and 16 will act as the contact etching stop layer during the step of forming the contact holes because the material for the interlayer dielectric layer 19 (BPSG) is different from the layer 14 and 16 (nitride). Therefore, claims 13 and 25 are *Prima Facie* obvious over Saitoh. Moreover, applicant admitted that this particular process is well known in the art (see application's specification, pages 14-15, paragraph 30-31).

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Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Saitoh by selecting the suitable thicknesses and the stress levels for the tensile stress dielectric layer and compressive stress dielectric layer, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

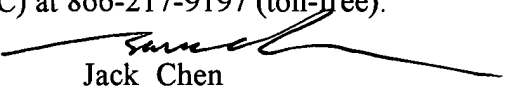
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Chen whose telephone number is (571)272-1689. The examiner can normally be reached on Monday-Friday (9:00am-6:30pm) alternate Monday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead can be reached on (571)272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jack Chen
Primary Examiner
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May 12, 2005